

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1 – 14 (cancelled)

Claim 15 (currently amended): A method of laser beam welding comprising:

- a) providing both a nitrogen containing gas and a helium containing gas;
- b) producing a shielding gas mixture by on site mixing, with a gas mixer means, the nitrogen containing gas and the helium containing gas, wherein the shielding gas mixture thereby consists essentially of nitrogen and helium;
- c) providing a laser beam having a laser beam power of between about 0.5 kW and about 30 kW;
- d) adjusting the composition of the shielding gas mixture, with the gas mixer means, in response to fluctuations in the power or power density of the laser beam by increasing the proportion of helium in the shielding gas mixture when the laser power or power density is increased;
- e) shielding the laser beam with the shielding gas mixture, wherein the helium volume proportion of the shielding gas mixture is between about 30% and about 80%; and
- f) welding at least one workpiece made of mild or stainless steel with the laser beam and the shielding gas mixture.

Claim 16 (cancelled)

Claim 17 (previously presented): The method of claim 15, wherein said laser power is between about 5 kW and about 20kW.

Claims 18 – 21 (cancelled)

Claim 22 (currently amended): The method of claim 21, wherein said mixture consists essentially of:

- a) a helium volume proportion of about 30% to about 80%; and
- b) a nitrogen volume proportion of about 20% to about 70%.

Claim 23 (cancelled)

Claim 24 (canceled): A method of laser beam welding with a shielding gas mixture, said mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture comprises about 1% to about 30% for a laser beam power of about 0.5 kW to about 4 kW, said mixture comprises about 50% to about 70% for a laser beam power of about 8 kW to about 12kW.

Claim 25 (previously presented): A method for laser beam welding with a shielding gas mixture, said mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture comprises about 1% to about 30% for a laser beam power density of about 500 kW/cm² to about 2000 kW/cm².

Claims 26 – 27 (cancelled)

Claim 28 (previously presented): A method of laser beam welding with a shielding gas mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture is a function of the power density such that:

$$28 \times \ln(\Phi_p) - 207 \leq \%He \leq 32.3 \times \ln(\Phi_p) - 207$$

wherein:

- a) $\ln(\Phi_p)$ represents the natural logarithm of said power density expressed in kW/cm²; and

- b) %He represents the volume percentage of helium in nitrogen of said gas mixture.

Claim 29 (previously presented): The process of claim 28, wherein said volume proportion of said helium in said mixture is a function of said power density such that:

$$28.5 \times \ln(\Phi_P) - 207 \leq \%He \leq 31.5 \times \ln(\Phi_P) - 207.$$

Claim 30 (previously presented): The process of claim 29, wherein said volume proportion of said helium in said mixture is a function of said power density such that:

$$29 \times \ln(\Phi_P) - 207 \leq \%He \leq 31 \times \ln(\Phi_P) - 207.$$

Claims 31-32 (canceled)

Claim 33 (previously presented): A method of laser beam welding with a shielding gas mixture, said mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture comprises about 30% to about 50% for a laser beam power density of about 2000 kW/cm² to about 4000 kw/cm².

Claim 34 (previously presented): A method of laser beam welding with a shielding gas mixture, said mixture comprising helium and nitrogen, wherein the volume proportion of said helium in said mixture comprises about 50% to about 70% for a laser beam power density of about 4000 kW/cm² to about 10000 kw/cm².

Claim 35 (new) The method of claim 15, wherein said workpiece is made of mild steel or stainless steel.